REMARKS

Entry of the foregoing, reexamination and further and favorable reconsideration of the subject application in light of the following remarks, pursuant to and consistent with 37 C.F.R. § 1.112, are respectfully requested.

The Office Action Summary correctly indicates that claims 1-10 and 12-30 were pending in the application. Claims 4-7 and 18-20 have been withdrawn from consideration. Claims 1-3, 8-10, 12-17, and 21-30 have been considered and stand rejected.

By the present amendment, claims 1, 12 to 17, 22, 24, 26-27 and 30 have been amended to recite "cotton plants" rather than "fiber-producing" plants. A similar amendment has been made to claims 18-20, currently withdrawn from consideration. Support for this amendment can be found throughout the specification, at least in originally filed claims 9, 10 and 21. Claims 9, 10 and 21 have been deleted without prejudice or disclaimer of the subject matter described therein. Claims 23, 25 and 28-29 which referred to claims 9, 10 and 21 have also been canceled without prejudice or disclaimer of the subject matter described therein.

Claim 1 has been further amended to recite that it concerns a method for altering fiber length development. Support for this amendment can be found throughout the specification, e.g. page 20, line 15-18; page 29, lines 11-13; page 31, lines 18-19.

Claim 15 has been further amended to recite that the claimed transgenic cotton plants have an altered characteristic selected from increased fiber length; improved fiber yield, altered fiber quality or increased seed size. Claim 22 has been amended to recite that the claimed seeds include the chimeric DNA recited in claim 15. Support for these amendments may be found throughout the specification and at least in the original claims.

No prohibited new matter has been introduced by way of the above amendments. Applicants reserve the right to file a continuation or divisional application on subject matter canceled by way of this Amendment.

Objection to the IDS filed 9/18/05

The information disclosure statement filed 9/18/05 has been objected to for citing GenBank entries by reference to the URLs at which the cited entries can be accessed. The IDS is hereby resubmitted with each entry cited by GenBank Accession No., and gives the "DEFINTION" field of the entry, which represents a title giving the source and content for the sequence, and the "PLN" field date which represents a publication date for the entry. Printed copies of the cited Genbank records obtained from NCBI are also resubmitted. Indication that the entries have been considered on the record is respectfully requested.

Rejections under 35 U.S.C. § 112

Claims 1-3, 8-10, 12-17 have been rejected under 35 USC §112, because the specification allegedly does not provide enablement for altering the fiber properties or development, or improving fiber yield or quality, or for increasing seed size of any plant other than cotton.

Without acquiescing to the Examiner's alleged reasons for the rejection, the independent claims have been amended to read on cotton plants, which has been acknowledged by the Office to be enabled subject matter. In particular, the Examiner has acknowledged that the specification is enabling for a method of altering fiber development or properties, or improving fiber yield or quality, or for increasing seed size in a cotton plant transformed with a plant sucrose synthase and plants and seeds transformed thereby.

In view of the foregoing, withdrawal of the rejection is respectfully requested.

Rejections under 35 U.S.C. § 101

Claims 22 and 23 have been rejected under 35 USC §101 because the claims as previously presented might have encompassed untransformed seeds, which are a product of nature.

Claim 23 has been canceled. Claim 22 has been amended to make clear that the claimed seeds comprise the chimeric DNA of the invention, thereby obviating the rejection. In view of the foregoing, withdrawal of the rejection is respectfully requested.

Rejections under 35 U.S.C. § 103

Claims 1-3, 8-10, 12-17 have been rejected under 35 USC §103(a) as being allegedly unpatentable over Conner (U.S. Patent Number 6,080,914) in view of Ruan et al. (*Plant Physiology*, 115:375-85, 1997) and further in view of Applicant's specification. The rejection is respectfully traversed.

The prior art fails to establish a proper prima facie case of obviousness. To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. M.P.E.P. § 2143.

It is impermissible to first ascertain factually what applicants did and then view the prior art in such a manner as to select from the random facts of that art only those which may be modified and then utilized to reconstruct applicant's invention from such prior art. *See, e.g., Interconnect Planning Corp. v. Feil*, 227 U.S.P.Q. 543, 550 (Fed. Cir. 1985); *see also, In re Shuman*, 150 U.S.P.Q. 54, 57 (C.C.P.A 1966). In asserting this rejection, the Office has taken a primary reference that unequivocally directed to very distinct subject matter, and

using impermissible hindsight, selectively picked secondary references that are purported to teach one individual modification or another in an attempt to reconstruct the presently claimed invention. However, the secondary reference itself shows that there would have been no motivation, and no reasonable expectation of success, to combine the references as proposed by the Office.

An analysis of obviousness of a claimed combination must include consideration of the results achieved by that combination. *The Gillette Co. v. S.C. Johnson & Son Inc.,* 16 USPQ2d 1923, 1928 (Fed. Cir. 1990). Critical to the analysis is an understanding of the particular results achieved by the new combination. *Id.* (citing *Interconnect Planning Corporation v. Feil,* 227 U.S.P.Q. 543, 551 (Fed. Cir 1985)).

The prior art failed to appreciate the results that may be achieved by the presently claimed methods and accordingly there would have been neither any motivation nor reasonable expectation of success in modifying the cited references as proposed by the Office. Conner is completely silent on the specific effects that can be achieved by expression of sucrose synthase in cotton plants, namely altering of the fiber length, fiber yield, fiber quality or seed size. Conner teaches strawberry promoters, capable of tissue-specific expression in transgenic plants. These promoters could be used in combination with *inter alia* sucrose synthase to develop fruit with stronger sink activity. Cotton ball and cotton seed were suggested amongst others (column 10, lines 1-15). Connor is not concerned with the expression of sucrose synthase in cotton plants and did not appreciate the effects such expression would have.

Ruan et al. fails to cure the deficiencies of Connor. Ruan et al does not teach nor suggest the notion that SuSy may be a rate limiting factor for fiber length development or quality, or seed size in cotton such that over-expression of SuSy could be used to alter, in

particular, increase fiber length, fiber yield, fiber quality or seed size. Ruan et al. is alleged as teaching that SuSy expression controls cellulose biosynthesis in plant cells. While this document correlates the presence of SuSy in fibers and seeds with sucrose metabolism in fibers and seeds and indicates how SuSy controls sink strength, Ruan et al. fails to suggest that SuSy expression can be used to alter, in particular, increase fiber length, fiber yield, fiber quality or seed size.

Indeed, it was not until the demonstration by the inventors disclosed in the current specification on page 29 that a linear correlation between fiber length and sucrose synthase activity up to the wild type level could be observed, that it was realized that sucrose synthase may be rate limiting for fiber development and that over-expression of sucrose synthase above the wild type level could increase fiber development, particularly fiber length development.

It will be noted that, contrary to the Examiner's attribution to Ruan et al. of the notion that sucrose synthase is controlling or limiting for fiber development, Ruan et al. uses words such as "abundance" or "great abundance" to characterize the level of SuSy protein in cells of cotton seed (page 383 right column, line 1 and line 9).

Furthermore, both Conner and Ruan et al. are completely silent on the influence of altering sucrose synthase activity on the fiber <u>length</u> or <u>seed size</u> in cotton as recited in claim 1 or claim 14, as currently presented.

Based upon the observations of Ruan et al., a person skilled in the art would have had no reason to believe that fiber development in cotton could be altered by increasing an already abundant protein. Moreover, the person skilled in the art would not have had a reasonable expectation of succeeding in altering fiber development by increasing this already abundant protein. To find such a motivation or reasonable expectation of success, one must

look to the present disclosure. However, to support a rejection, the motivation and reasonable expectation must com from outside the Applicants disclosure; the use of that kind of hindsight is not permitted in formulating a rejection. *See, e.g., Interconnect Planning Corp. v. Feil*, 227 U.S.P.Q. 543, 550 (Fed. Cir. 1985); *see also, In re Shuman*, 150 U.S.P.Q. 54, 57 (C.C.P.A 1966). For at least the foregoing reasons, withdrawal of the rejection is respectfully requested.

CONCLUSION

In view of the foregoing, further and favorable action in the form of a Notice of Allowance is believed to be next in order. Such action is earnestly solicited.

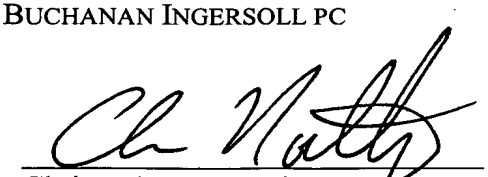
In the event that there are any questions relating to this application, it would be appreciated if the Examiner would telephone the undersigned concerning such questions so that prosecution of this application may be expedited.

The Director is hereby authorized to charge any appropriate fees that may be required by this paper, and to credit any overpayment, to Deposit Account No. 02-4800.

Respectfully submitted,

BUCHANAN INGERSOLL PC

Date: June 20, 2006

By: 

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P.O. Box 1404
Alexandria, VA 22313-1404
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  AUTHORS   Wang,F., Smith,A.G. and Brenner,M.L.
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  TITLE     Sucrose synthase genes in barley. cDNA cloning of the Ss2 type and
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  JOURNAL   FEBS Lett. 320 (2), 177-181 (1993)
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  AUTHORS   Martinez de Ilarduya,O.
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2581 ctgttgagtc cccatgttgt catggaaggg aaactggatg gatgctatgt tattggtact
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2701 aggaattc
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1: Z15028. Reports O.sativa mRNA for...[gi:20373] Links

Features Sequence

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LOCUS       OSSUPHSY                2627 bp    mRNA    linear   PLN 12-OCT-1992
DEFINITION  O.sativa mRNA for sucrose synthase.
ACCESSION   Z15028
VERSION     Z15028.1  GI:20373
KEYWORDS    sucrose-phosphate synthase.
SOURCE      Oryza sativa
  ORGANISM  Oryza sativa
            Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
            Spermatophyta; Magnoliophyta; Liliopsida; Poales; Poaceae; BEP
            clade; Ehrhartoideae; Oryzeae; Oryza.
REFERENCE   1  (bases 1 to 2627)
  AUTHORS   Odegard,W. and de Lumen,B.O.
  TITLE     Isolation and sequence of a sucrose synthase cDNA from developing
            rice seeds
  JOURNAL   Unpublished
REFERENCE   2  (bases 1 to 2627)
  AUTHORS   Odegard,W.
  TITLE     Direct Submission
  JOURNAL   Submitted (28-AUG-1992) William Odegard, Nutritional Sciences,
            University of California, University of California Berkeley,
            Berkeley, CA, 94720, USA
FEATURES             Location/Qualifiers
     source          1..2627
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                     /tissue_type="Seeds"
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                     /EC_number="2.4.1.13"
                     /codon_start=1
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                     /protein_id="CAA78747.1"
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ORIGIN

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     2521 tccatgtttg ccatggatgt gtactatgtc taaggtttca gtacttttgc gagattttgg
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Apr 11 2006 19:57:30

1: Z11532. Reports S.officinarum SUS...[gi:21341] Links

Features Sequence

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LOCUS       SOSUS1MR                  654 bp    mRNA    linear   PLN 09-FEB-1999
DEFINITION  S.officinarum SUS1 mRNA for sucrose synthase.
ACCESSION   Z11532
VERSION     Z11532.1  GI:21341
KEYWORDS    sucrose synthase.
SOURCE      Saccharum officinarum
  ORGANISM  Saccharum officinarum
            Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
            Spermatophyta; Magnoliophyta; Liliopsida; Poales; Poaceae; PACCAD
            clade; Panicoideae; Andropogoneae; Saccharum; Saccharum officinarum
            complex.
REFERENCE   1  (bases 1 to 654)
  AUTHORS   Angampalli,S., Moore,P.H. and Maretzki,A.
  TITLE     Amplification and Cloning of Sugarcane Sucrose synthase cDNA by
            anchored PCR
  JOURNAL   Nucleic Acids Res. (1991) In press
REFERENCE   2  (bases 1 to 654)
  AUTHORS   Angampalli,S.
  TITLE     Direct Submission
  JOURNAL   Submitted (04-DEC-1991) Angampalli S., HAWAIIAN SUGAR PLANTERS
            ASSOCIATION, 99-193 AIEA HEIGHTS DRIVE, AIEA, HI, USA
FEATURES             Location/Qualifiers
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                     /db_xref="taxon:4547"
     gene            1..654
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     CDS             <1..>654
                     /gene="SUS1"
                     /EC_number="2.4.1.13"
                     /function="Reversable cleavage of sucrose into UDPGlucose
                     and Fructose"
                     /standard_name="UDP-Glucose-Fructose Glucosyltransferase"
                     /note="Amplified SS sequence using consensus sequences of
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                     /citation=[1]
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1: M18745. Reports Potato sucrose sy...[gi:169571] Links

Comment Features Sequence

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LOCUS       POTSSYN                 2711 bp    mRNA    linear   PLN 27-APR-1993
DEFINITION  Potato sucrose synthase mRNA, complete cds.
ACCESSION   M18745
VERSION     M18745.1  GI:169571
KEYWORDS    sucrose synthase.
SOURCE      Solanum tuberosum (potato)
  ORGANISM  Solanum tuberosum
            Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
            Spermatophyta; Magnoliophyta; eudicotyledons; core eudicotyledons;
            asterids; lamiids; Solanales; Solanaceae; Solanum.
REFERENCE   1  (bases 1 to 2711)
  AUTHORS   Salanoubat,M. and Belliard,G.
  TITLE     Molecular cloning and sequencing of sucrose synthase cDNA from
            potato (Solanum tuberosum L.): preliminary characterization of
            sucrose synthase mRNA distribution
  JOURNAL   Gene 60 (1), 47-56 (1987)
   PUBMED   2964386
COMMENT     Original source text: Potato (L. var. Sirtema) tuber, cDNA to mRNA,
            clone lambda-10a.
            Draft entry and computer-readable sequence for [1] kindly provided
            by M.Salanoubat, 07-APR-1988.
FEATURES             Location/Qualifiers
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     CDS             76..2493
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ORIGIN 442 bp upstream of SalI site.

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1: L22296. Reports Zea mays sucrose ...[gi:514945] Links

Comment Features Sequence

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LOCUS       MZESUS1A                2908 bp    mRNA    linear   PLN 22-JUL-1994
DEFINITION  Zea mays sucrose synthase (Sus1) mRNA, complete cds.
ACCESSION   L22296
VERSION     L22296.1  GI:514945
KEYWORDS    UDP-glucose:D-fructose 2-glucosyl-transferase; sucrose synthase.
SOURCE      Zea mays
  ORGANISM  Zea mays
            Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
            Spermatophyta; Magnoliophyta; Liliopsida; Poales; Poaceae; PACCAD
            clade; Panicoideae; Andropogoneae; Zea.
REFERENCE   1  (bases 1 to 2908)
  AUTHORS   Huang,X.-F., Nguyen-Quoc,B., Chourey,P.S. and Yelle,S.
  TITLE     Complete nucleotide sequence of the sucrose synthase 2 cDNA of
            maize
  JOURNAL   Unpublished (1994)
COMMENT     On Jul 23, 1994 this sequence version replaced gi:443762.
            Original source text: Zea mays cDNA to mRNA.
FEATURES             Location/Qualifiers
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     CDS             28..2478
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                     /standard_name="sucrose synthase"
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ORIGIN

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Apr 11 2006 19:57:30

1: U73588. Reports Gossypium hirsutu...[gi:4733945] Links

Comment Features Sequence

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LOCUS       U73588                  2625 bp    mRNA    linear   PLN 04-MAY-1999
DEFINITION  Gossypium hirsutum sucrose synthase mRNA, complete cds.
ACCESSION   U73588
VERSION     U73588.2  GI:4733945
KEYWORDS    .
SOURCE      Gossypium hirsutum (upland cotton)
  ORGANISM  Gossypium hirsutum
            Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
            Spermatophyta; Magnoliophyta; eudicotyledons; core eudicotyledons;
            rosids; eurosids II; Malvales; Malvaceae; Malvoideae; Gossypium.
REFERENCE   1  (bases 1 to 2625)
  AUTHORS   Perez-Grau,L. and Delmer,D.
  TITLE     Direct Submission
  JOURNAL   Submitted (07-OCT-1996) Calgene, Inc., 1920 Fifth Street, Davis, CA
            95616, USA
COMMENT     On May 4, 1999 this sequence version replaced gi:4098126.
FEATURES             Location/Qualifiers
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polyA_site 2608..2625

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1: X81974. Reports B.vulgaris mRNA f...[gi:1488569] Links

Features Sequence

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LOCUS       BVSSMRNA                2563 bp    mRNA    linear   PLN 25-MAR-1997
DEFINITION  B.vulgaris mRNA for sucrose synthase.
ACCESSION   X81974
VERSION     X81974.1  GI:1488569
KEYWORDS    SBSS 1 gene; sucrose synthase.
SOURCE      Beta vulgaris subsp. vulgaris
  ORGANISM  Beta vulgaris subsp. vulgaris
            Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
            Spermatophyta; Magnoliophyta; eudicotyledons; core eudicotyledons;
            Caryophyllales; Amaranthaceae; Beta.
REFERENCE   1  (bases 1 to 2563)
  AUTHORS   Hesse,H. and Willmitzer,L.
  TITLE     Expression analysis of a sucrose synthase gene from sugar beet
            (Beta vulgaris L.)
  JOURNAL   Plant Mol. Biol. 30 (5), 863-872 (1996)
   PUBMED   8639746
REFERENCE   2  (bases 1 to 2563)
  AUTHORS   Hesse,H.
  TITLE     Direct Submission
  JOURNAL   Submitted (27-SEP-1994) H. Hesse, Institut fur Genbiologische
            Forschung Berlin GmbH, Ihnestr.63, 14195 Berlin, FRG
FEATURES             Location/Qualifiers
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Apr 11 2006 19:57:30

1: X75332. Reports D.carota (Nantais...[gi:406316] Links

Features Sequence

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LOCUS       DCRNASS                 2866 bp    mRNA    linear   PLN 09-SEP-2004
DEFINITION  D.carota (Nantaise) mRNA for sucrose synthase.
ACCESSION   X75332
VERSION     X75332.1  GI:406316
KEYWORDS    sucrose synthase.
SOURCE      Daucus carota (carrot)
  ORGANISM  Daucus carota
            Eukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
            Spermatophyta; Magnoliophyta; eudicotyledons; core eudicotyledons;
            asterids; campanulids; Apiales; Apiaceae; Apioideae; Scandiceae;
            Daucinae; Daucus.
REFERENCE   1
  AUTHORS   Sebkova,V., Unger,C., Hardegger,M. and Sturm,A.
  TITLE     Biochemical, physiological, and molecular characterization of
            sucrose synthase from Daucus carota
  JOURNAL   Plant Physiol. 108 (1), 75-83 (1995)
   PUBMED   7784526
REFERENCE   2  (bases 1 to 2866)
  AUTHORS   Sturm,A.
  TITLE     Direct Submission
  JOURNAL   Submitted (01-OCT-1993) A. Sturm, Friedrich Miescher-Institute,
            Postfach 2543, CH-4002 Basel, SWITZERLAND
FEATURES             Location/Qualifiers
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Apr 11 2006 19:57:30

1: X69773. Reports V.faba mRNA for s...[gi:22037] Links

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ACCESSION   X69773
VERSION     X69773.1  GI:22037
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SOURCE      Vicia faba (fava bean)
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REFERENCE   1  (bases 1 to 2647)
  AUTHORS   Heim,U., Weber,H., Baumlein,H. and Wobus,U.
  TITLE     A sucrose-synthase gene of Vicia faba L.: expression patterns in
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  JOURNAL   Planta 3, 394-401 (1993)
REFERENCE   2  (bases 1 to 2647)
  AUTHORS   Heim,U.
  TITLE     Direct Submission
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ORIGIN

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